

# ROYAL GARDENS, KEW.

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## BULLETIN

OF

### MISCELLANEOUS INFORMATION.

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#### CCXXXVIII.—FIJI GINGER.

(*Zingiber officinale*, Rosc.)

The ginger plant is not known in a truly wild state, but it is believed to be a native of tropical Asia. It is now cultivated in all the warmer countries of the globe. Ginger is used as a condiment and as a medicine. The preserved ginger of shops is prepared by selecting the young rhizomes, and after being washed and scraped they are preserved in jars with syrup. As a rule Jamaica ginger is most valued, and after that come Cochin, Bengal, and African sorts. The bulk of the preserved ginger comes from China (*Kew Bulletin*, January 1892, p. 16). Ginger is regarded as an exhausting crop, and it can only be grown on the same land for a limited number of seasons. The soil should be rich and cool (moderately moist), and the rhizomes require to be taken up at the end of the season of growth when the leaves show signs of withering.

Dry or green ginger is generally imported into the United Kingdom in barrels weighing about one hundredweight each. The quantity imported in 1889 was 63,511 cwts., of the value of 97,716*l*. In 1891 this had fallen to 17,436 cwts., of the value of 54,553*l*. Candied and preserved ginger in syrup is no doubt included under "succades," but is not separately given.

In many new colonies an attempt is generally made to grow ginger. The plant is readily propagated, and provided the soil is good and not too dry, the crop is abundant. There are, however, practical difficulties experienced in preparing the rhizomes for market, and, in some instances, the cultivation has become stationary or been abandoned on that account. Apparently this difficulty has been lately felt at Fiji. The aid of Kew was sought, and as shown in the following correspondence there is some hope that Fiji ginger may become an article of local industry.

ROYAL GARDENS, KEW, to COLONIAL OFFICE.

SIR.

Royal Gardens, Kew, March 5, 1892.

I AM desired by Mr. Thiselton-Dyer to inform you that at the request of Sir John B. Thurston, K.C.M.G., Governor of Fiji, there

was recently received at Kew a sample of cured ginger prepared at the Botanical Station at Suva by the Curator, Mr. D. Yeoward.

2. In a letter received from Mr. Yeoward on March 29, 1891, he said, "I am seeking to acquire, if possible, some information on the proper way of curing ginger for export. On my arrival in the colony I found a large quantity of ginger was growing in the former botanical garden established by the Governor. After the leaves had withered down (and while the rhizomes were in a resting stage) they were taken up. A large quantity was distributed amongst planters throughout the group, and I myself planted about half an acre here. Last year, upon taking up the rhizomes, I experimented on some for curing. Excepting during the process of scalding I only allowed them to remain in the water for about five minutes. After this I placed them on the verandah in the sun to dry, but dry they never would. About six weeks afterwards they commenced to grow."

3. In response to Mr. Yeoward's request a copy of instructions for curing ginger, prepared at the request of Sir William Robinson, K.C.M.G., when Governor of Trinidad, was forwarded to him, and on August 7, 1891, he wrote, "I have to acknowledge the receipt of your letter, dated March 30th, 1891, and I have to express my thanks for the copy of instructions on the curing of ginger which will be put into force. I do not know yet how the sample will turn out, time will prove."

4. The present sample of Fiji ginger has probably, therefore, been cured according to the instructions furnished from Kew. When it reached Kew it was attractive in appearance, and of good colour and flavour. For the purpose of obtaining a commercial report upon its quality and value it was submitted to two eminent firms in the City, and a copy of their replies is enclosed herewith. It will be noticed that there is a slight divergence of opinion as regards the actual market value of the sample. Messrs. Lewis and Peat place the present value at 40s. to 42s. per cwt., while Messrs. W. and D. Harvest are of opinion it is not worth more than 34s. to 36s. per cwt. The result of the reference is, however, of a sufficiently satisfactory character to encourage further effort being made to prepare Fiji ginger. As a first attempt the sample is certainly a good one, and Sir John Thurston, who takes so deep an interest in the development of industries at Fiji, may be congratulated on the result so far attained in growing and exporting ginger as a local industry.

I have, &c.

The Hon. R. H. Meade, C.B.  
Colonial Office, S.W.

(Signed) D. MORRIS,  
Assistant Director.

[Enclosure 1.]

MESSRS. LEWIS AND PEAT TO ROYAL GARDENS, KEW.

6, Mincing Lane, E.C.,  
March 3, 1892.

DEAR SIR,

WE are in receipt of your favour of yesterday, with sample of ginger from Fiji.

We have carefully examined same, and find it good plump white, part hard and part soft; present value about 40s. to 42s. per cwt., prompt 14 days, less  $2\frac{1}{2}\%$  discount.

The market is a good one, owing to short crops of Cochin and Calicut descriptions.

Always at your service.

We are, &c.  
(Signed) LEWIS AND PEAT.



[Enclosure 2.]

Messrs. W. AND D. HARVEST to ROYAL GARDENS, KEW.

Dowgate Dock, Upper Thames Street, E.C.,

DEAR SIR,

March 3, 1892.

WE have examined the sample of Fiji ginger, and believe its present commercial value in London to be about 34s. to 36s. per cwt. The quality is very inferior to the ordinary East India ginger or that produced in the island of Jamaica, being rather hard and unsuitable for many purposes for which ginger is now used. The ginger produced in Japan bears a strong resemblance to your sample.

We are, &amp;c.

(Signed) W. AND D. HARVEST.

We may remark that the value of East India ginger during the last two or three years has advanced from 100 to 120  $\frac{1}{2}$ %.

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The following instructions in regard to the cultivation and curing of Jamaica ginger were printed at the request of Sir William Robinson, K.C.M.G., for distribution by the District Agricultural Boards, Trinidad, 11th October 1886:—

Ginger is propagated by the smaller pieces, prongs, or protuberances of the root, each of which throws up two different stems; the first bears the leaves, and rises to the height sometimes of three feet or upwards, but its usual growth seldom exceeds 18 inches. It thrives best in a rich, cool soil, and, therefore, what has been recently cleared from wood is well adapted to the culture of it, more especially as it is supposed to be a great impoverisher of land. In such a soil it grows so luxuriantly that a hard or large spreading root will weigh near a pound. It is, however, remarked that what is produced from a clayey, tenacious soil shrinks less in scalding, while such as is raised in richer, free, black moulds loses considerably in that operation. The land intended for the cultivation of it is first well cleaned with the hoe, then slightly trenched, and planted about the month of March or April. It attains its full height and flowers about August or September, and fades about the close of the year. When the stalk is entirely withered the roots are in the proper state for digging. This is generally performed in the months of January and February. After being dug they are picked, cleansed, and gradually seethed or scalded in boiling water, they are then spread out and exposed every day to the sun till sufficiently dried, and after being divided into parcels of about 100 lbs. each, they are packed in bags for the market; this is called the *black ginger*. The manner of scalding the roots is as follows:—A large pot or copper is fixed in the field or some convenient place, which is kept full of boiling water; the picked ginger, being divided into small parcels, is laid in baskets, and plunged alternately in the water, where it is suffered to stay for the space of 10 or 15 minutes; it is then spread on a platform for drying; but care is taken during the process to change the water so soon as it becomes much impregnated with the juices of the root.

The white sort differs but little from the black roots. The difference there arises wholly from the methods of curing them; the white is never scalded, but, instead of this easy process they are picked, scraped, and washed one at a time, and then dried; all which requires too much pains

and time for any real advantage to be gained in the properties; though, being made more agreeable to the eye, the price of the white is much higher at market. When the root is intended for a sugar-preserve, it is dug while tender and full of juice; the stems at this time rarely exceed 5 or 6 inches in height; the root is carefully picked, washed, and afterwards scalded, till it is sufficiently tender; it is then put in cold water, and peeled and scraped gradually. This operation may last three or four days, during which it is commonly kept in water, and the water frequently shifted, as well for cleanliness as to extract more of the native acrimony. After this preparation it is laid in unglazed jars and covered with a thin syrup, which in two or three days is shifted and a richer put in; this is sometimes removed for a third or fourth, but more than three are seldom requisite. The shifted syrups are not lost, for in Jamaica they are diluted with water and fermented into a pleasant liquor called cool drink, with some mixture of the chaw-stick, *lignum vitæ*, and sugar.—*Long's Jamaica*, p. 700.

Jamaica, 16th October 1886.

I UNDERSTAND that Sir William Robinson wishes for information merely in respect of the *curing* of ginger, not its cultivation.

The method pursued in Jamaica is extremely simple. The ginger being about 10 months to 1 year old from the time of planting, having arrived at maturity begins to wither, the leaves getting yellow and shrivelled. The roots are then dug up, *great* care being taken not to *bruise* them. If the epidermis (skin) of the root is injured, it discolours the product. After the roots are dug, they are carefully trimmed with a sharp penknife and picked and allowed to dry in the air for a few hours until all the accompanying earth can be rubbed or wiped off with a soft cloth. The cleaned roots are then placed a few at the time in boiling water and scalded, and the epidermis is scraped off with a sharpened bamboo like a very narrow flexible paper knife. As soon as scraped they should be placed in the sun until apparently free from dampness. After this the drying is continued. Gradual drying results in a better product than quick drying. A few hours a day in the morning sunshine and in air-drying sheds until after 8 to 12 days the fingers break off sharp and clear. The ginger is then cured and should be sorted, all of one colour being kept separate and large again separated from small. The water used in scalding should be clear and free from iron or excess of lime.

The foregoing really contains all that can be stated in the matter.

(Signed) W. BANCROFT ESPEUT, F.L.S.

Botanical Department, Jamaica,  
November 16, 1886.

JAMAICA ginger is cured in two ways, one in producing the commodity known as "uncoated ginger," the other "coated ginger," both saleable in English or American markets.

To produce the "uncoated ginger," which is that prepared for medicinal use, the fresh rhizome is simply scraped, washed, and then well dried in the sun. When thus prepared it should have a pale buff hue, a striated and fibrous surface, should break easily, exhibiting a *short farinaceous* fracture with numerous bristle-like fibres. It is often further prepared by bleaching, being subjected to the fumes of burning sulphur, or immersed in chlorinated lime. Much of that sold in England is coated with calcareous matter, either sulphate or carbonate of calcium.



These bleaching and covering processes are, however, usually performed after the article reaches the first market.

"Coated ginger" is prepared by being dried in the sun without removing the epidermis, which causes the article to assume a crude and wrinkled appearance.

The rhizomes should be collected after growth is made for the season, which may be known by the leaves turning yellow and gradually drying up.

(Signed) J. H. HART.

Since the above was in type an interesting note by Mr. E. H. Gane on Fiji ginger (from Kew) has appeared in the *Pharmaceutical Journal*, March 26, 1892, p. 802. This shows that Fiji ginger "is remarkable for its exceeding fine aroma and peculiar pleasant taste." It is also stated to be "by far the richest in active constituents":—

"Though not of such fine appearance as the Jamaica ginger, yet it [Fiji ginger] was finer than the other two commercial varieties, and was especially remarkable for its exceedingly fine aroma and peculiar pleasant taste, recalling that of lemon. The rhizome had evidently been carefully dried, as was evidenced by the small amount of moisture present. The rhizome is rather more fibrous than the Jamaica, and some of the pieces are heavy and resinous, but otherwise the structure appears similar. Its powder is of a slightly darker colour than a fine Jamaica ginger, but about the same colour as the commercial article, and therefore much lighter than either the Cochin or African. The fine lemon-like odour is much more distinct in the powder.

"To examine its active constituents the method adopted by Dr. Thresh was followed. A known weight of the rhizome in fine powder was packed in a percolator and exhausted with alcohol. Alcohol was chosen as the solvent, as all the important constituents of the plant were known to be soluble in it. A similar operation was simultaneously carried out on a sample of Jamaica. The resulting tincture of the Fijian was darker, more aromatic and pungent than that of the Jamaica ginger. \* \*

"Comparing the results of the above two analyses with those obtained from Cochin China and Africa by Dr. Thresh we have the following figures:—

	Jamaica per cent.	Cochin per cent.	African per cent.	Fijian per cent.
Volatile oil - -	·64	1·35	1·615	1·45
Fatty matter - -	·92	1·200	1·225	·86
Resins - -	1·76	1·815	3·775	4·47
Acid and neutral gingerol	·84	·600	1·45	1·82
Moisture - -	13·66	13·53	14·515	11·25
Ash - -	4·53	4·8	4·27	4·06

"On comparison it will be seen that the Fijian ginger is by far the richest in active constituents. The amount of volatile oil obtained seems rather low compared with the powerful aroma of the drug, but probably an appreciable amount was lost, owing to the method of determination, and more accurate methods would lead to a higher figure."

## CCXXXIX.—DECADES KEWENSES.

## PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM.

The energy and curiosity of the British race is inextinguishable. It traverses and explores every part of the world, and pours into Kew a continuous stream of botanical information and specimens. It requires the unremitting exertions of a staff, none too numerous, to prevent these accumulating on its hands.

The collections received in this way, at no cost to the Government, are all examined and reported upon to their donors. When of sufficient magnitude and importance they are made, as in the case of the late Colonel Grant's collections in Central Africa, the subject of a detailed memoir. Anything of sufficient interest in smaller collections is illustrated with a plate in "*Hooker's Icones Plantarum*." Novelties of insufficient importance to justify a plate have hitherto been relegated to their proper places in the Herbarium, where they await description by some monographer.

It has been found, however, that collectors are best encouraged when they see that the result of their labours supplies some tangible addition to scientific knowledge. It seems expedient therefore to describe, for the information of botanists, and distinguish by formal names all plants received at Kew of which the novelty can be ascertained with some certainty. And in accordance with the principle laid down by the First Commissioner, that the *Kew Bulletin* is to be made the vehicle, as far as possible, of all information which it is thought expedient by the establishment to communicate for public information, successive Decades of plant-descriptions will from time to time be published in its pages:

Species marked with an asterisk are in cultivation in the Royal Gardens.

## DECAS I.

1. *Clematis Prattii*, Hemsl. [Ranunculaceæ]; species inter *C. japonicam* et *C. lasiandram* medium tenens, foliis semper 3-foliolatis, foliolis integris vel rarissime obscure paucidentatis, sepalis quam stamina longioribus, carpellis numerosissimis ovoideis pilosis.

*Hab.*—China: Hupeh, in the Patung District, Dr. A. Henry, 4920, 6817; Szechuen, on the summit of Mount Omei, Rev. E. Faber, 731; North Wushan, Dr. A. Henry, 6704; chiefly near Tachienlu, at 9,000 to 13,500 feet, Mr. A. E. Pratt, 169 and 238.

Dr. O. Kuntze designates this (manuscript in the Kew Herbarium), a variety, foliolis integerrimis, of *C. japonica*, Thunb., and there can be no question about a close genetic connexion; but it is easily distinguished by the entire leaflets and by the much more numerous ovoid hairy carpels. In *C. japonica* the carpels are less numerous, almost or quite glabrous, elongated, and almost spindle-shaped. Moreover, if we unite *C. japonica* and *C. Prattii*, we must go further and include *C. lasiandra*, Maxim., which has carpels very similar to those of *C. Prattii* associated with usually 5-foliolate leaves.

2. *Gleditschia officinalis*, Hemsl. [Leguminosæ-Cæsalpinieæ]; arbor foliis pinnatis, foliolis fere rectis obscurissime crenulatis, legumine angusto 3-4 poll. longo.

*Arbor* 30-40 pedalis trunco spinis armato (A. Henry), ramulis floriferis flexuosis inermibus parce puberulis pallidis crebre lenticellatis. *Folia* ramulorum floriferorum omnia simpliciter pinnata, fere omnino glabra, cum petiolo 6-10 poll. longa; foliola 6-10, opposita, brevis-



sime petiolulata, subcoriacea, ovali-oblonga vel ovata,  $1\frac{1}{2}$ – $3\frac{1}{2}$  poll. longa, et 1–2 poll. lata, obtusa, basi rotundata, supra nitida, subtus secus costam primum puberula, venis transversis numerosissimis. *Flores* ♀ laxae racemosi, racemis folia æquantibus vel brevioribus, pedicellis puberulis gracilibus quam flores paullo longioribus; calysis lobi sæpius 4, æquales, lanceolato-oblonga vix acuta; petala isomera, paullo longiora (circiter 4 lineas longa) obtusa; ovarium breviter stipitatum, crassum, compressum, pilosulum, multiovulatum. *Legumen* (maturum non visum) distincte stipitatum, glabrescens, glaucum vel pruinatum, compressum, marginatum, 3–4 poll. longum, 5–6 lineas latum, plus minusve curvatum, acuminatum.

*Hab.*—China: South Wushan, Szechuen, Dr. A. Henry, 5619, 7230.

A very distinct species with broad leaflets and a short narrow pod. The pod is used in medicine, and is exported from the Province of Szechuen under the name of “Ya-tsao;” and Dr. A. Henry notes that the tree scarcely occurs eastward of that province. Nevertheless it is very probable that his specimens, numbered 7771, from the neighbourhood of Ichang, are the male of this species, though the leaflets are much smaller; but it is better not to run the risk of drawing up the description from two species, therefore it has not been included in the description.

Among the Chinese drugs in the museum of the Pharmaceutical Society of London, are pods of this *Gleditschia* bearing the name cited by Dr. Henry.

3. *\*Ipomæa Lesteri*, Baker [Convolvulacæ]; perennis, caule gracili volubili pilis patentibus vestito, foliis integris glabris ovato-sagittatis longe petiolatis, floribus axillaribus 1–3–nis longe pedunculatis, bracteis magnis ovatis foliaceis persistentibus, sepalis ovatis obtusis glabris minute mucronatis, corollâ magna infundibulari splendide rubra.

*Hab.*—Tropical Africa: Upper Guinea; South bank of the Gambia river, Dr. Brown Lester.

*Folia* 3–5 pollicaria. *Sepala* pollicaria. *Corollâ* 3–4 pollicaria.

This very handsome new species belongs to the subgenus *Euipomæa*. It is nearly allied to *I. sagittata*, Desf. (*I. sagittifolia*, Ker in Bot. Reg. tab. 437). I find that there are no less than 120 species of *Ipomæa* now known in tropical Africa, a large number of which are yet unnamed and undescribed.

4. *Gaertnera morindoides*, Baker [Loganiacæ]; sarmentosa, glabra, foliis oblongis acuminatis basi cuneatis, floribus in capitulis parvis globosis aggregatis, calyce campanulato ore truncato, corollæ tubo cylindrico, segmentis lineari-oblongis tubo brevioribus, filamentis brevissimis, antheris lineari-oblongis.

*Hab.*—Tropical Africa: Upper Guinea; Tonkah Limbah, inland from Sierra Leone, Garrett, 23. Native name, *Lengkelli*.

*Folia* 3–4 poll. longa. *Calyx* 1 lin. longus. *Corollæ* tubus 3 lin. longus. *Stamina* ad tubi faucem inserta.

Easily distinguished from all the other tropical African species by its capitate inflorescence.

5. *\*Cyrtanthus (Gastronema) Galpini*, Baker [Amaryllideæ]; bulbo ovoideo tunicis pallidis membranaceis, foliis hysteranthiis mihi ignotis, scapo gracillimo unifloro, spathæ valvis 2 lanceolatis membranaceis, pedicello producto, perianthio splendide rubro luteo tincto, tubo basi cylindrico supra medium late infundibulari, segmentis ovatis obtusis

mucronatis tubo 2-3-plo brevioribus, staminibus biseriatis prope tubi medium insertis, antheris parvis oblongis, stylo antheris eminente ramis stigmatosis tribus magnis subulatis patulis.

*Hab.*—South Africa: Rocky hillsides, Barberton, Transvaal, alt. 3,000 feet, flowering without the leaves in August, *Galpin*, 409.

*Bulbus* 7-8 lin. diam. *Pedunculus* 3-5 pollicaris. *Spathæ* valvæ 9-12 lin. longæ, pedicello longiores. *Perianthium* 2 poll. longum, tubi ore 6-8 lin. diam.

A new species of *Cyrtanthus*, of the subgenus *Gastronema*, with bright red flowers flushed with yellow, allied to *C. sanguineus*, Hook., in Bot. Mag. t. 5218. Well worthy of being introduced into cultivation.

6. \**Aloe* (*Eualoe*) *Boylei*, *Baker* [Liliaceæ]; acaulis, foliis subcarnosis tenuibus lanceolatis acuminatis, dentibus marginalibus crebris patulis parvis deltoideis albidis, pedunculo simplici robusto, floribus pluribus in capitulum globosum aggregatis, pedicellis elongatis, bracteis magnis scariosis ovatis acuminatis, perianthio pallido tubo subnullo segmentis lanceolatis, staminibus perianthio brevioribus.

*Hab.*—South Africa: Head of the Tugela Valley, Natal; gathered by Mr. Allison. A dried specimen received from Mr. F. Boyle, April 1891.

*Folia* pedalia et ultra, 9-12 lin. lata. *Capitulum* 5 poll. diam., pedicellis  $1\frac{1}{2}$ -2 poll. longis, bracteis inferioribus 12-15 lin. longis. *Perianthium* 12-15 lin. longum.

Nearly allied to *A. Cooperi*, *Baker* (Bot. Mag. tab. 6377), from which it differs by its lanceolate leaves, ovate bracts and acute perianth-segments. Mr. Allison has also presented a living plant to Kew.

7. *Tripogon* *Lisboæ*, *Stapf* [Gramineæ]; gluma vacua superiore acuta nervo crasso percursa margine membranaceo angusto vel angustissimo, glumis florentibus nervo medio in aristam rectam brevem, lateralibus in mucronulos brevissimos productis.

*Perennis*, ad  $2\frac{1}{2}$  ped. altus. *Folia* ligula obsoleta (an semper?), lamina longissime attenuata, 11-15 poll. longa et basi  $1\frac{1}{2}$ - $2\frac{1}{2}$  lin. lata, rigida plerumque convoluta supra imprimis basin versus pilosa et vasculis scleromaticis 7-9 valde prominulis percursa. *Spica* 6-8 poll. longa, angusta. *Spiculæ* pro numero florum  $2\frac{1}{2}$ - $5\frac{1}{2}$  lin. longæ, primum arcute approximatae unilaterales, demum divergentes. *Glumæ* vacuæ valde inæquales, inferior in latere intus spectante dente obtuso aucta, superior lanceolata  $1\frac{1}{2}$ -2 lin. longa, florentes 5-12, basi pilis brevissimis suffultæ, ovato-lanceolatae,  $1\frac{1}{2}$ - $1\frac{3}{4}$  lin. longæ, arista media  $\frac{1}{3}$  lin. longa, superiores 1-2 vacuæ. *Palea* bidentata in carinis superne asperula. *Caryopsis* anguste oblonga, teres, glabra.

*Hab.*—India, from Canara and Mysore to Mt. Abu: Canara and Mysore, *Law*; Bombay Presidency, *Lisboa*; on rocks near the Carley Coves, near Poonah, *Jacquemont*, 581; Rajputana, Mt. Abu, on rocks, *Duthie*, 6788.

The plant from Canara and Mysore was distributed in "Herb. Ind. Or. Hook. fil. et Thomson," under No. 5 as *Tripogon*. The specimen in the Kew Herbarium consists of 9 spikes, some of them with the uppermost leaf on the culm. They are less robust than *Lisboa*'s or *Duthie*'s plants, but the structure of the spikelets and flowers is quite the same.



8. *Tripogon Jacquemontii*, Stapf [Gramineæ]; gluma vacua superiore apice minutissime tridentata nervo medio tenui basi subbipartito, glumis florentibus nervo medio in aristam rectam brevem, lateralibus in mucronulos interdum fere obsoletos productis.

*Perenne*, 1-2 ped. alt. altus. *Folia* ligula brevissime ciliata, lamina convoluta subfiliformi glabra, innovationum  $3\frac{1}{2}$ - $5\frac{1}{2}$  poll., culmorum ad 2 poll. longa, supra vasculis scleromaticis 17-19 tenuissimis percursa. *Spica* ad  $5\frac{1}{2}$  poll. longa angusta. *Spiculæ* pro florum numero  $4\frac{1}{2}$ -13 lin. longæ, spatio eorum longitudine 2-3 plo. breviores remotæ vel interdum imprimis basin spicæ versus magis distantes, plus minusve secundæ. *Glumæ* vacuæ valde inæquales, inferior in latere intus spectante dente lato truncato aucta, superior lanceolata; florentes 10-21 basi pilis brevibus suffultæ ovato-oblongæ, apice erosæ,  $1\frac{1}{2}$ -2 lin. longæ, arista media  $\frac{1}{3}$  lin. longa, superiores 1-3 vacuæ. *Palea* bidentata in carinis superne asperula. *Caryopsis* anguste oblonga teres glabra.

*Hab.*—India, from the Western Ghats to Bengal: Bombay Presidency, *Lisboa*, G. M. Woodrow, 79; Poona, *Jacquemont*, 320 bis; Sholapur, *Herb. Munro*; Bengal, *Griffith*, Kew Distr., No. 6636.

The structure of the spikelets and flowers is, apart from their larger size and usually looser disposition, very much like that of spikelets and flowers of *Tripogon Lisboa*. The lateral nerves end in very minute bristles, which are hardly produced beyond the scabrous margin of the small terminal lobes; in the Bengal specimen, however, they are distinct, yet very short. But the leaves differ very much from those of *Tripogon Lisboa*, especially in their anatomical structure.

*Tripogon Lisboa* is nearest allied to *T. bromoides*, Roth., to which species *T. zeylanicus*, Nees in Stued., *T. festucoides*, Jaub. et Spach, *T. Griffithii*, Nees ex Steud., and *T. lanatus*, Hochst. ex Steud., must be reduced as synonyms, and in a less degree to a species which has hitherto only been found in Sikkim, the Khasia Mountains, and Tonkin, and was named *Tripogon trifidus* by Munro in mss. It differs in the very robust habit, which, however, is almost reached in some of the stouter specimens of *T. trifidus*, and in the still more reduced awns, the lateral ones being almost suppressed. The same thing occurs in *T. Jacquemontii* the spikelets of which sometimes assume a rather peculiar appearance in a mature state as they fill out and resemble those of certain forms of *Eragrostis corromandeliana*, Trin. Indeed, the affinities of these *Tripogons* and the species of *Eragrostis* of the group of *E. corromandeliana* is very great, the difference between them almost being reduced to the shape of the caryopsis and the absence of awns or terminal lobes in the flowering glumes of *Eragrostis*. On the other hand, the two new *Tripogons* connect to a certain degree the group of *T. bromoides*, Roth, *trifidus* Munro mss., *filiformis*, Nees in Steud. (of which I find *T. unidentatus*, Nees in Steud. is a synonym), and *T. capillatus*, Jaub. et Spach, with the group of *T. abyssinicus*, Nees in Steud. The latter is represented in the Himalaya by a form which can hardly be considered as a distinct species, the *Catapodium filiforme*, Nees in Steud., or *Festuca filiformis*, Steud. The differences of the *Tripogon* species are taken from apparently very trifling characters, as, for instance, the development or reduction of awns. They are, however, within limited geographical areas remarkably constant, and coincide with a certain similarity in the habit which is not easy to convey in a short description.

9. *Aristida redacta*, Stapf [Gramineæ]; gluma vacua inferiore plerumque sola persistente, florente parte inferiore ovarium fovente

sub anthesi membranacea tubuloso-involuta demum chartacea, superne indurata subdilata et sensim in aristam abeunte supra semen facile secedente sed non vere articulata, arista usque ad geniculationem contorta, hic setis brevibus vel brevissimis tenuibus aucta vel simplice.

*Annua*, interdum perennans et tunc robustior culmis inferne parce ramosis et laxius vaginatis, 1-2 ped. alta. *Folia* vaginis glabris, ligula angusta breviter denseque ciliata, lamina plus minusve setaceo-convoluta, culmorum ad  $5\frac{1}{2}$  poll. longa, innovationum multo brevior, sparse longeque pilosa supra et in marginibus asperula infra lævi. *Panicula* laxa, demum expansa, ad  $9\frac{1}{2}$  poll. longa, ad  $7\frac{1}{2}$  poll. lata, ramis plerumque geminatis remotis demum patulis, pedicellis inæquilongis, glumis semper brevioribus. *Glumæ* vacuæ subæquales anguste lanceolatae subulato-acuminatae, breviter aristatae, 5-7 lin. longæ; florens callo piloso insidens plerumque purpurascens cum arista 13-17 lin. longa. *Aristæ* laterales setiformes, ut media scabriusculæ  $\frac{1}{2}$ - $1\frac{1}{2}$ , rarius ad 3 lin. longæ vel nullæ. *Palea* hyalina, oblonga, obtusa vel erosa, enervis, ovario subæquilonga. Lodiculæ 2, ovatae vel oblongæ, 7-9 nerves, nervis tenuissimis. *Caryopsis* subcilindrica, teres, glaberrima.

*Hab.*—India. from the Western Ghats to Eastern Chuttanagpur: Bombay Presidency, *Lisboa*, G. M. Woodrow; Central Provinces: Nagpur District, *Duthie*, 10,605; Bengal Presidency, Burdwan District, near Burrakur, C. B. Clarke, 21,115.

This species is very remarkable on account of the occasional complete suppression at the lateral awns and the imperfect articulation in the upper part of the flowering glume. Intermediary forms may be found from awns with lateral setæ  $1\frac{1}{2}$ - $2\frac{1}{2}$  lines long to awns without any. Such glumes are especially, if the articulation is more distinct, exceedingly similar to those of certain *Stipas*, and I was indeed first inclined to regard the present plant as a *Stipa*. But as I said the articulation is imperfect, and, as far as my investigation goes, not caused by the forming of a special tissue within which the disarticulation takes place. The tender tissue of the lower part of the glume passes more or less suddenly into a considerable thickening just above the ovary or the caryopsis, and here it is that the upper part with the awn comes off in a mature state, sometimes with a smooth sometimes with a rough margin. Besides, there are invariably only two lodiculæ, and the palea is also of the same character as in the allied species of *Aristida*, of which *A. funiculata*, Trin., is the nearest. There are a few Central American species of *Aristida* which are said to have reduced or entirely suppressed lateral awns. They were originally referred to *Streptachne* by Kunth (H. B. et K. Nov. Gen. et Sp., I. 124, t. 40) and to the section *Chataria* of *Aristida* by Bentham in the Gen. Plant. But as far as I can see from the material in the Kew Herbarium, the lateral awns are entirely absent in these specimens, and there is no trace of articulation, not even of the imperfect form as in *Aristida redacta*. This variation in the development of the lateral awns shows once more the comparative inconstancy of one of the very few characters upon which the distinction between *Aristida* and *Stipa* is founded. On the other hand, it is a very remarkable fact that in India both genera inhabit almost separate areas, the *Stipas* belonging to the Himalaya, the Punjab and Sind, representing elements of the Mediterranean and Central Asian flora, whilst the *Aristidas* are mostly restricted to the Deccan Peninsula and Ceylon, and only a few of them reach the Punjab and the upper Gangetic Plain, and only one is found in a limited part of the Himalaya.

10. *Gymnogramme* (Selliguea) *Baileyi*, Baker [Filices]; rhizomate gracili longe repente paleis parvis lanceolatis brunneis membranaceis



vestito, stipite gracili nudo, frondibus membranaceis glabris in stipitem longe attenuatis simplicibus lanceolatis vel oblongo-lanceolatis profunde pinnatifidis, lobis primariis 3-4 jugis ascendentibus lanceolatis integris, venis in areolas copiosas hexagonas venulis liberis inclusis anastomosantibus, soris linearibus inter costam et marginem medialibus. *Grammitis membranacea*, Bailey Synops. Queensland Flora, Supplement, iii. p. 94, non Blume.

*Hab.*—Australia: Queensland, on the Bellenden-Ker range, alt. 4,000 feet, *Bailey*.

*Stipes* 3-4 pollicaris. *Folia* simplicia 9-12 lin. lata, pinnatifida 4-5 poll. lata, pinnis 5-6 lin. latis.

This appears to be quite distinct both from the Javan *G. membranacea*, Hook., and the North Australian *G. Sayeri*, F. M. & Baker. In habit and variety of cutting it closely resembles the well-known *Polypodium scandens*, Forst.

## CCXL.—AGRICULTURAL RESOURCES OF ZANZIBAR.

A correspondence has taken place between the Foreign Office and Kew respecting the plant industries of Zanzibar. Samples of fibre prepared from the pine-apple and other plants were received, and an estimate obtained of their commercial value.

Subsequently the Secretary of State communicated a report, in which Mr. G. H. Portal, C.B., Her Majesty's Agent and Consul-General, dealt at some length with the agricultural industries of Zanzibar generally. This report is included in an account of the trade of Zanzibar, which has been printed in the Foreign Office Reports [*Annual Series*, 1892, No. 982, Diplomatic and Consular Reports on Trade and Finance, C.—6559.—44], and is therefore not now reproduced.

During the time that Sir John Kirk was resident in Zanzibar he maintained at his own expense an experimental garden, in which he tried every useful tropical plant likely to be adapted to the climate. These were for the most part supplied from Kew. It seemed desirable to put on record, for future guidance, some account of the results of work in which Sir John Kirk took an enthusiastic interest. For this purpose he has very kindly furnished the following letter.

The importance of the subject may be measured by the fact that the plants established by Sir John Kirk's energy in Zanzibar and Pemba will always in the future be available for stocking plantations on the mainland of Eastern Africa.

SIR JOHN KIRK, G.C.M.G., to ROYAL GARDENS, KEW.

DEAR THISELTON-DYER, Sevenoaks, 21st February 1892.

I HAVE read with interest the papers you sent me for perusal on the vegetable products of the islands of Zanzibar and Pemba, now under the direct administration of British officers.

The following remarks apply only to the islands of Zanzibar and Pemba, where the climate and products differ considerably from those of the mainland in consequence of the greater variation of temperature and the absence there of rain for several months of the year.

The accompanying table, giving the results of a series of observations taken with reliable instruments throughout a series of five years, which have been corrected for index and other errors at the Observatory, Bombay, will show better than any general description the main features

of the climate of the town of Zanzibar. It is, however, well to note that if reliance is to be placed on observations taken 40 years ago, the rainfall has since then diminished to about one third of what it then was. In confirmation of this we know that there has been a gradual and marked diminution during the last 30 years.

The chief vegetable products of the islands of commercial importance at the present time are :—

The Clove (*Eugenia caryophyllata*, Thb.), first introduced into cultivation in the islands of Mauritius and Bourbon (Réunion) by the French in 1770 was taken to Zanzibar about 70 years ago, where it became an article of general attention to the Arab planters of Zanzibar and Pemba. Previous to the year 1872, when the whole of the island of Zanzibar and the southern part of Pemba were swept by a hurricane that destroyed the clove trees, the crop reached from 7,000,000 to 11,000,000 lbs. weight yearly, two thirds of which were produced by estates in Zanzibar. It is only within the last six years that the plantations of clove trees have been restored and come into full bearing again. The crop of the two islands, as shown by Mr. Portal's report, now exceeds what it was previous to the hurricane.

[An account of the Clove industry at Zanzibar is given in United States Consular Reports, April 1890, p. 687, by Consul Pratt.]

The crop next in importance to the clove is that of the Cocoa-nut Palm (*Cocos nucifera*, L.), which yields both oil and fibre. This also suffered excessively in the hurricane of 1872, before which time the value of cocoa-nuts exported amounted to nearly 200,000*l.* per annum in the form of copra, which was sent to Bombay and Marseilles or used for the manufacture of oil on the spot.

The young cocoa-nut palm in both the island of Zanzibar and on the mainland is peculiarly liable to the attack of a large rhinoceros beetle, one of the Lamellicorns, *Oryctes insularis*, Coq. The ordinary cocoa-nut palm takes eight years to come into bearing, but there is a dwarf kind that bears after five years.

Sugar-cane (*Saccharum officinarum*, L.).—Before the introduction of the clove the sugar-cane was much grown. It has since been tried on a large scale, but the climate and soil are badly suited for it, and the plant is attacked by a beetle, *Heteronychus atratus*, Klug, that bores into the cane underground, causing it to rot, and so destroying great patches in the districts so affected.

Chillies (*Capsicum annuum*, L., and *C. frutescens*, L., probably).—The small red peppers or chillies are largely grown in the more dry and rocky part of the island, where the upheaved coral presents a honey-combed surface, that favours the accumulation of rich soil in the crevices. The pods are picked when ripe, sun-dried, and packed in mat bags made of the split frond of the Hyphæne palm for shipment. This is an industry that has sprung up within the last 30 years.

[Zanzibar chillies, as they appear in the market in a dry state, are small, red, thin, carrot-shaped fruits about an inch in length. They fetch in Mincing Lane public sales from 70*s.* to 140*s.* per cwt.]

Following the above vegetable products known in trade as exports from Zanzibar, come the cereals, the vegetables and fruits in common use. These are: Maize (*Zea Mays*, L.); Sorghum or Guinea corn (*Sorghum vulgare*, Pers.); Rice (*Oryza sativa*, L.); African Millet or Kous (*Pennisetum typhoideum*, Rich.); Eleusine or Kurakan (*Eleusine corocana*, Gaertn. ?); Cassava (*Manihot utilissima*, Pohl.); sweet potato (*Ipomœa Batatas*, Lam.); Yams (*Dioscorea* spp.) and *Colocasia*. There is a great variety of peas and pulse, including *Cajanus* (*Cajanus indicus*, Spr.); The Bambarra ground-nut



(*Voandzeia subterranea*, Thouars), called "Litlo" in the Shiré valley; and the common ground-nut (*Arachis hypogæa*, L.). The chief vegetables are Pumpkin, Vegetable Marrow, Brinjal (*Solanum Melongena*, L.), and Bhamia (*Hibiscus esculentus*, L.). The common tomato grows everywhere.

The fruits are: the Mango (*Mangifera indica*, L.), introduced in old times by Arabs and everywhere cultivated. There are in the islands trees of great age and of many fine varieties. More recently new kinds have been introduced from Réunion and from Bombay, but there are few better than those already grown in Zanzibar. The *Citrus* fruits such as the Orange, Mandarin orange of two kinds, Lemon, Citron, Lime, Sweet Lime, are all common. The oranges are of the very best kind. The Pumelow or Shaddock (*Citrus decumana*, Willd.) grows well, but the fruit has not the best flavour. The Anonas, including the Custard Apple or Bullock's heart (*Anona reticulata*, L.), Sour Sop *Anona muricata*, L.), and Sweet Sop (*Anona squamosa*, L.), all grow well. The Litchi (*Nephelium Litchi*, Don), introduced about the same time as the clove, grows well. The Rambutan (*Nephelium lappaceum*, L.), is thriving. The Avocado pear (*Persea gratissima*, Gærtn.) was introduced quite recently; it grows well. Guava (*Psidium Guayava*, Raddi), the common guava, grows everywhere; there are also two other species lately introduced. The Rose Apple (*Eugenia Jambos*, L.), the Jambosa (*Eugenia Jambolana*), and Zimberao (? *Eugenia malaccensis*, L.), are all grown by the Arabs, the last has become almost wild.

Durian (*Durio Zibethinus*, D.C.), is found only on a few estates, but grows and yields well.

Jack fruit (*Artocarpus integrifolia*, L.), is found everywhere in the islands, and much eaten by natives. The wood also is valuable, being almost the only native timber soft enough to be easily worked.

Bread fruit (*Artocarpus incisa*, L.). Only a few trees of this are to be found in the islands.

Mulberry (*Morus indica*, L.). The species grown is the small Indian black mulberry. The bush is seen everywhere, being used to mark boundaries between estates. A twig pushed into the ground takes root so readily that it is used for this purpose along with *Jatropha Curcas*.

Mangosteen (*Garcinia Mangostana*, L.). This has been introduced, but although there are trees of some size they have not yet flowered.

The Vine (*Vitis vinifera*, L.). The grape vine yields poorly, the climate being too hot. The Arabs obtain a crop by beating the leaves off so as to produce a time of rest to the plant.

Date Palm (*Phoenix dactylifera*, L.). The date grows, but the fruit is worthless.

Papaw (*Carica Papaya*, L.) grows everywhere, especially in rocky ground and among rubbish. The seeds are used by the slave women to bring on abortion.

Pine Apple (*Ananas sativus*, Baker). The common pine of Zanzibar is big and rather coarse from careless cultivation. It becomes almost wild, when it produces large leaves that have been used to yield fibre. This, however, has never been an article of trade in the islands.

Passion-fruit. The large Granadilla (*Passiflora macrocarpa*, Mast.) grows profusely wherever it has been planted, but is not valued.

The following are the chief oil seeds now in use:—

*Arachis hypogæa*, L., the ground nut, is more grown on the mainland than in the islands.

*Sesamum indicum*, L., known locally as Sim-sim.—This also is extensively cultivated, but chiefly on the mainland. There are two kinds, the white and the black. The common castor oil plant (*Ricinus communis*, L.) is found in every village, and the seed used for oil.

A Cucurbit (*Telfairia occidentalis*, Hk. f.) is a native of the island and also of the mainland; the seeds are roasted and eaten; oil also is prepared from them.

The oil palm (*Elæis guineensis*, Jacq.). The oil palm occurs in Zanzibar wild, but is abundant in Pemba. The kernal is exported, but the husk yields very little oil. The species requires verification.

[Specimens of oil-palm from Zanzibar, believed by Sir John Kirk to be identical with that found in Central Africa by himself on Lake Nyassa, and by Captain Burton on Tanganyika, were received at Kew in 1868.]

The following are the chief fibres:—

Cordage is made from the coir of the cocoa-nut and exported.

Cotton. Cloth is made of the native cotton (*Gossypium*, spp.) which grows readily, but the bole is very subject to be attacked by insects, and the occurrence of rain when the crop is ready to pick makes cotton a crop ill suited to the islands although eminently so to the mainland.

*Furcraea gigantea*, Vent., known as Mauritius hemp, and another species introduced from Mauritius, both yield fibre. The plants grow well. [For an account of Mauritius hemp see *Kew Bulletin*, 1887, March, p. 8.]

The common American aloe (*Agave americana*, L.) has been introduced, but does not spread like the *Furcraea*. The species of *Sansevieria* common in the islands is worthless, being too short in the fibre. Other species on the mainland yield excellent fibre. [*Kew Bulletin*, May 1887.]

Dyes. Indigo is perhaps the only vegetable dye that has been manufactured for export in the islands. The industry has been abandoned for near 40 years, and the tanks have gone to ruin. The plant grows wild everywhere.

*Orchella-weed* (probably derived from one or more species of *Roccella*.) This is obtainable in Zanzibar, but the supply for trade is all derived from the northern coast of the mainland.

Logwood (*Hæmatoxylon campechianum*, L.) has been introduced, and spreads rapidly, being evidently well adapted to the climate and soil.

Coffee. Arabian coffee (*Coffea arabica*, L.) is grown by the Arabs, but yields badly, the plant is also peculiarly liable to be killed suddenly by the attack of a beetle that bores down the pith to the root.

Liberian Coffee (*Coffea liberica*, Hiern) has been introduced, grows well, and yields freely, the coffee being of excellent quality.

Areca nut (*Areca Catechu*, L.).—The Betel palm grows and supplies not only the local demand, but also a certain amount for export. Betel pepper (*Piper Betle*, L.) is grown for its leaf in places artificially watered and shaded. The leaf is sold in every village. Vanilla (*Vanilla planifolia*, And.) was introduced from Réunion; it grows badly in Zanzibar, but might no doubt do better in the island of Pemba, where the rainfall is supposed to be greater. Is is however, a plant requiring too much delicate manipulation to suit the natives. Pimento (*Pimenta officinalis*, Ldl.).—This was introduced and grows well as far as I have had experience. Cinnamon (*Cinnamomum zeylanicum*, Nees), and Nutmeg (*Myristica fragrans*, Houtt.) were introduced almost 70 years ago; both grow still in many places: but no attention is paid to their cultivation. Chinese Cassia (*Cinnamomum Cassia*, Bl.) has recently been introduced and seemed to promise well.



Cacao (*Theobroma Cacao*, L.).—This has been grown, but the soil of the islands is in general too light, and the air too dry for the crop to succeed. Tea (*Camellia theifera*, Griff.).—This does not thrive and will never be a product of the island of Zanzibar; it has not been yet tried in Pemba. In addition to the above a host of other plants have been introduced from Kew to the experimental garden established by me at Mbweni, amongst which are the Mahogany (*Swietenia Mahagoni*, L.) which grows well; the Ceara rubber (*Manihot Glaziovii*, Mull. Arg.), which spreads everywhere, but yields little juice; the Para rubber (*Hevea brasiliensis*, Mull. Arg.), which grows well, but had not flowered; the Brazil nut (*Bertholletia excelsa*, Humb.), which grows and was forming a good stem, although it will be several years before it can bear fruit.

The Jujube tree (*Zizyphus Jujuba*, Lam.) has been introduced from India and grows well. The Annatto plant (*Bixa Orellana*, L.) is very common about Arab gardens. The Henna plant (*Lawsonia inermis*, L.) grows freely and is almost naturalised. The Cashew nut (*Anacardium occidentale*, L.) is in all Arab gardens. The common fig (*Ficus Carica*, L.) is commonly cultivated for the fruit which, however, is poor.

[Mr. Portal states that "sago palms grow with apparent health and "luxuriance, but their cultivation on a large scale has never been "attempted." There are apparently no true sago palms (species of *Metroxylon*) in Zanzibar. The plants mentioned by Mr. Portal may be species of *Encephalartos* or other Cycads. These contain a kind of sago in the pith of the stem, and hence are sometimes called "sago palms."]

MEANS OF METEOROLOGICAL OBSERVATIONS (reduced to sea-level) taken in the Town of ZANZIBAR in the five years 1880 to 1884, inclusive.

Month.	Mean Maximum.	Mean Minimum.	Approximate mean Temperature.	Extreme Range.	Barometer (reduced to sea-level and Temperature 32°).	Humidity.		Rainfall.	Number of Days on which rain fell.	Month.
						10 a.m.	4 p.m.			
January -	85°4	77°7	81°	13°6	29°899	79	67	2°77	7	January.
February -	85°9	78°	81°4	14°4	29°893	79	68	5°27	9	February.
March -	86°9	78°8	82°3	13°8	29°888	79	67	3°95	7	March.
April -	84°9	77°4	80°5	16°1	29°929	80	75	10°24	18	April.
May -	82°7	75°4	78°2	14°4	29°995	83	74	10°12	17	May.
June -	83°8	74°5	77°9	12°4	30°085	77	60	0°31	3	June.
July -	81°7	73°2	76°4	13°1	30°103	77	60	2°03	6	July.
August -	82°3	72°5	76°4	14°2	30°386	75	57	1°19	7	August.
September	83°5	73°8	77°6	13°4	30°078	76	61	1°12	7	September.
October -	83°9	74°9	78°7	14°4	30°006	78	63	2°52	11	October.
November	84°6	76°4	80°4	14°1	29°924	78	68	5°00	14	November.
December-	85°4	77°4	80°8	13°2	29°923	79	67	4°35	12	December.
						Total -		48°87	118	

Mean temperature = 79°·3.

Highest temperature recorded = 91°·2 in February 1882; lowest = 67°·4 in September 1884.

## CCXLI.—BOTANICAL STATION, ST. VINCENT.

Amongst the botanical stations lately started in the West Indies (in accordance with a scheme described in the *Kew Bulletin*, June and July 1887) there is none invested with so much interest as the station now in course of being established in the island of St. Vincent.

St. Vincent is one of the Windward Islands lying about 100 miles westerly of Barbados. It is a picturesque and fertile island, and very healthy. There are lofty hills in the centre covered with forests, and from these numerous less elevated ridges diverge towards the sea, intersected by deep ravines. The total area is 133 square miles, with a population of 50,000. At present only about one-sixth of the surface of the island is under permanent cultivation.\*

Briefly stated the object sought by the establishment of a botanical station in St. Vincent is to provide a small but efficient centre for propagating and distributing industrial plants, and to afford aid and information in regard to their cultivation in suitable localities in the island. The site of the botanical station is that occupied by the old botanical garden of St. Vincent, begun so long ago as 1765. This was the first institution of the kind started in the West Indies and possibly in any part of the new world. There are several very old botanical establishments in the West Indies. The Jamaica Botanic Garden at Bath was established about 1774, and the botanic garden at St. Pierre, Martinique, according to the *Annuaire de la Martinique*, 1884 was established "30 pluviôse an xi. (19 février 1803)." Anderson, in one of his letters from St. Vincent, dated 20 November 1786, refers to the "French King's Garden at Cayenne" (French Guiana). The Trinidad Botanic Garden appears to have been established a little before or about the time of the removal of some of the plants in the St. Vincent garden to Trinidad in May 1823. The present attempt to establish a botanical station at St. Vincent is owing to the enterprising and well directed efforts of the present Governor-in-Chief of the Windward Islands, the Hon. Sir Walter Hely Hutchinson, K.C.M.G. In the address of his Excellency to the Legislative Council of St. Vincent, dated the 27th May 1890, he said :—

"In the meanwhile, whilst not losing sight of the claims of sugar, I have felt it my duty to encourage and assist, by every means in my power, the introduction and improvement of other industries. To this end I have addressed to the Director of the Royal Gardens at Kew a series of inquiries as to the cultivation and manufacture of arrowroot, the replies to which may, I trust, lead to an improvement of the quality and price of that article as manufactured in St. Vincent, and I have asked you to provide for the re-establishment of the old botanic garden here, in order that we may have at our command the services of a scientifically trained botanist and horticulturist, whose duty it will be to conduct, in connexion with the establishment at Kew, experiments with economic plants, to supply, at cost price, plants, seedlings, and seeds of economic plants to persons who desire to cultivate them, and to give to landowners, large and small, such information as he may possess or can obtain and they may require, either with regard to the cultivation

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\* An account of the fruits of St. Vincent is given in the *Kew Bulletin*, 1888, p. 187. A sketch of the island and its productions, with suggestions for establishing the botanical station, are given in the report of Mr. Morris' mission to the West Indies, *Kew Bulletin*, 1891, pp. 140-145.









of the plants, with regard to the extirpation of parasites and diseases to which the plants may be liable, or with reference to the preparation and disposal of the economic products. A small botanical library will gradually be formed, which will be available for reference, and it is my intention that a periodical *Bulletin* be issued containing such information, or pointing out where it may be gained, as may be of assistance in developing the agricultural resources of the island.

"The Curator of the botanic garden, Mr. H. Powell, arrived by the last mail [14th May, 1890], and the regulations for the management of the garden, and prescribing the duties of the Curator, will shortly be published."

Mr. Henry Powell, the first Curator of the St. Vincent botanical station, had been trained at Kew, and had previously worked in the gardens at Goodrich Court near Ross. In addition to his horticultural training he held certificates for attendance at lectures in scientific subjects at Kew. The results of Mr. Powell's efforts will be given later.

The history of the old botanic garden of St. Vincent is well preserved. The most complete account of the institution is given by the Rev. Lansdown Guilding, B.A., F.L.S., who resided for many years in the island, and who was well acquainted with its fauna and flora. Mr. Guilding's botanical collections are in the Kew Herbarium, and they have been utilised in the preparation of the *Flora of the British West India Islands* (one of the series of Colonial Floras organised at Kew under the direction of the late Sir William Hooker), by Dr. A. H. R. Grisebach, in 1864. Mr. Guilding's account of the St. Vincent Garden, published in 1825, is a quarto pamphlet with four coloured plates, dedicated to Sir William Hooker when Regius Professor of Botany at Glasgow.\*

The coloured plates consist of: (1) a view of the house of the Superintendent; (2) a view of the garden looking from the Superintendent's house in the direction of Kingstown; (3) a view in the garden from the bottom of the centre walk or avenue; (4) a diagram of the garden showing the original land and the additions made a few years later, making altogether  $39\frac{1}{2}$  acres.†

The situation of the garden was a sheltered rich valley, with a perennial stream running through it. It was less than a mile distant from Kingstown, the capital, and it was well adapted in every way for the purposes of cultivation. As Mr. Guilding's work is now scarce, the following extracts are taken from it descriptive of the St. Vincent Garden from its establishment in 1765, until 1825, a period of 60 years:—

"This garden seems to owe its origin to certain advertisements in the *Transactions of the Society of Arts* for 1762 and the four following years, offering rewards to any one who should cultivate a spot in the West Indies in which plants, useful in medicine and profitable as articles of commerce, might be propagated, and where nurseries of the valuable productions of Asia and other distant parts might be formed for the benefit of his Majesty's colonies.

\* An account of the botanical garden in the island of St. Vincent, by the Rev. Lansdown Guilding, B.A., F.L.S., with four coloured plates. Glasgow, Richard Griffin & Co., 1825.

† Wm. Mavor, in a History of the Discovery and Settlement of North and South America and West Indies, 1812, appears to have referred particularly to the St. Vincent Botanic Garden, but this work is not at Kew.

"General Melville, who was then Chief Governor of the ceded islands, while he resided in St. Vincent, with a laudable and patriotic zeal, resolved to commence the task; and in 1765 gave, and cleared at his own expense, 20 acres of land in the most favourable situation he could find, about half a mile distant, in a northerly direction from Kingstown, and abundantly supplied with water. To this, in 1766, another portion of ground was added. . . . Dr. George Young, Surgeon to the Forces, the principal Medical Officer stationed in the island, was first intrusted with the charge of the ground, which he held for many years. In 1774, the doctor made a report of his progress to the Society of Arts, which they were pleased to reward with a present of 50 guineas. In the troubled times which succeeded, the garden was much neglected and injured, but was again restored in 1785, and somewhat increased, by Alexander Anderson, Esq., Surgeon, who was shortly afterwards appointed its Superintendent.

"At this period the institution was taken under the protection of Government, who supported it with great liberality till it was presented to the colony in 1822. In 1792 it was increased, but it suffered in some degree during our contest with the French and Caribs. Mr. Anderson, with great pains, collected all the most remarkable of the native plants, and in his excursions to other islands obtained many curious species. In his travels over our own mountains, in 1784, he discovered the crater of Morne Soufrière. . . .

"About 1787, the Clove, and several varieties of Cinnamon, were introduced from the French islands, to which they had been brought by their ships from Asia. The Clove, shortly after this period, was cultivated zealously in Dominique (San Domingo). In Jamaica the Cinnamon was planted on a large scale in many parts of that extensive colony.

"Books of great value, which had any reference to the plants likely to be cultivated, were now sent out by his Majesty, who was pleased to patronise the garden, and felt much concern for its prosperity. Mr. Anderson, in 1791, sailed to Guiana in search of valuable plants, where his zeal was amply rewarded. He now received from one of the universities of Scotland the degree of M.D., and was elected a fellow of the Royal Society of Edinburgh. Pleased with his incessant attention and useful labours for the benefit of the public, the Society of Arts presented him with their silver medal, elected him a corresponding member (1798), and gave him many other tokens of their approbation, while they published from time to time the communications made to them on the progress of his labours.

"Every exertion was made, as well by private individuals as by the authorities in England, to render his Majesty's Botanic Garden of St. Vincent the source from which valuable plants might be spread over the adjacent islands. Trials were made to introduce plantations of *Cactus Coccinellifer* [*Opuntia* (Nopalea) *coccinellifera*, Mill.], and to propagate the Cochineal insect. Many valuable seeds from Asia were sent here by the Board of Trade: at a subsequent period others were forwarded by the Board of Agriculture. A considerable number were procured from correspondents in North America, almost all of which are now flourishing and dispersed over our colonies.

"The Superintendent's salary was first fixed by Government at 7*s.* 6*d.* a day. It was afterward increased to 10*s.*, and at a subsequent period to 1*l.*, which, with rations, enabled him to live in comfort and respectability. No proper dwelling had been provided till 1798-9, when Sir George Young, Bart., a warm and zealous friend to this establishment, procured an order that a comfortable and convenient house should



be erected; in 1804 and 1808 it underwent some trifling repairs, but is now in a most ruinous condition from neglect, so rapid is the destruction of buildings within the tropics from the effects of heavy rains and the attacks of the termites [wood ants].

"So great was the interest taken in this garden, which promised to be a source of much profit to the colonies, and of commerce to the mother country, that his Majesty was pleased, in 1790, to send a ship to the South Seas to procure for it the bread-fruit (*Artocarpus incisa*) and every other valuable tree that could be obtained. The lamentable termination of this first voyage is known to everyone. . . .

"Not discouraged by the fate of the first, the King determined to fit out a second ship of discovery, and shortly afterwards Captain Bligh set sail in the 'Providence' . . . .

"In December 1792 Captain Bligh touched at St. Helena on his return, and in January 1793 attended by Captain Portlock of the 'Assistant' brig, landed the best portion of his valuable cargo, about 530 plants, on the shores of St. Vincent. The young trees, which were as vigorous as if they had only travelled from our mountains, instead of having crossed a wide and troubled ocean, were instantly planted out, and after a proper interval distributed among the colonies. Having performed this duty, Captain Bligh proceeded to Jamaica, where another portion was delivered, and with the remainder (destined for his Majesty's gardens at Kew) set sail for Europe.

"The total number of plants delivered amounted to 1,217; besides, there were 700 reserved for Kew. In 1794 the bread-fruit began to bear.

"In 1798 a catalogue was made of all the plants within the garden area, conveniently arranged; and another was published by the Society of Arts in the 25th volume of their transactions.

"In 1803, 10 acres were taken from the adjoining Crown lands, commonly called the Barrack land, and added to the garden.

"Mr. Lochead, who afterwards succeeded Dr. Anderson, had obtained from Cayenne several *Nutmegs*\* and other plants which he had nursed in Trinidad with the greatest care. These, in 1809, were introduced by Captain Dix of his Majesty's sloop 'Cygnet,' who readily undertook the charge of them by permission of Admiral Cochrane, who then commanded on the station. These trees have borne well for many years, and considerable nurseries are established both here and in Trinidad. Even our young plants of both sexes have this year produced their flowers in great abundance.

"Worn out with toil, the venerable Anderson began to decline, and in July 1811 resigned the garden to his estimable friend and fellow-labourer William Lochead, Esq., M.W.S. Edinburgh. In 1812 this gentleman was confirmed in office but shortly afterwards suspended by the Governor. In October 1813 he was restored to his charge by an order from the authorities in England.

"On the 8th of September 1811 the virtuous Anderson was numbered with the dead."

Anderson appears to have kept up a close correspondence from 1775 to 1795, with William Forsyth, Senior, who was Curator of the Chelsea Garden in 1769, and afterwards Royal Gardener at Kensington and

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\* Dr. Anderson, however, had the honour of introducing the nutmeg into St. Vincent, as appears from his two letters inserted in the 21st and 22nd volumes of the *Transactions of the Society of Arts*.

St. James's palaces until his death in 1804. Anderson's correspondence passed into the hands of Forsyth's executor, by whom it was given to Dr. Robert Hogg, F.L.S., about fifty years ago. It has lately been presented by Dr. Hogg to Kew. This correspondence has been rather fully printed with notes in the eighth volume of the *Cottage Gardener* (now better known as the *Journal of Horticulture*).

The early letters are addressed from New York and Philadelphia, where Anderson was apparently stationed as surgeon with the British troops. He was afterwards transferred to the West Indies and wrote interesting letters, sending home parcels of seeds and plants, from Martinique, St. Lucia, Grenada, and St. Vincent. At the latter place, he describes his position as hospital mate. In 1785, he was appointed to the charge of the Botanic Garden but his position at first was one of some difficulty. On the 1st June 1785, he writes,—“I am at present disagreeably situated with Governor Lincoln opposing me by every means in his power. He wishes to oppose the appointment, and to appropriate the ground and house to his own use. He seems to pay no attention to the instructions Sir George Young sent me. The land [of the Botanic Garden] is a common grass piece for his cattle and gangs of negroes traversing it every moment.”

In May 1786, he writes,—“You cannot conceive the trouble and anxiety I have experienced since I had charge of this place . . . I have [now] above seven acres in good order and am at present clearing about two acres more, on a cool and elevated situation, for extra-tropical plants.”

Again in November of the same year,—“I have got an artilleryman as a gardener, and I shall soon make excursions among the islands . . . We have had great doings in St. Vincent for these ten days by H.R.H. Prince William Henry [afterwards King William IV.] paying us a visit. He honoured the garden with a visit and was much pleased with it.”

In a letter to Dr. Young, the former Superintendent living in England, dated May 4, 1787, Anderson gives the following hints respecting sending seeds to the tropics: “If the seeds were thrown into a box with earth, even among the roots of other plants, they would come up [germinate] during the voyage, and I should receive them in great perfection. From reserving the earth in the boxes which I have received with plants, I have obtained many seedlings. In this manner I obtained from Philadelphia the paper mulberry and the golden rod, and this year from England, the common dock, the chick-weed, the crowfoot, *Euphorbia*, and others . . .

Further on he asks, “Is there any particular time or mode in drying the senna leaves? I have some fine thriving plants of the Alexandrina senna, from seeds sent me by Sir Joseph Banks.” This senna plant became afterwards naturalised in Jamaica on the Palisadoes, and no doubt it may have spread to other parts of the West Indies.

Anderson acknowledges the receipt on May 2nd, 1789, of a parcel of plants sent by Mr. Aiton of Kew. Amongst them were the Jalap and Ginseng, both however, he says, “had perished on the voyage and were a great loss to me.”

The arrival of the bread-fruit plants in the “Providence,” was a great event to Anderson. He writes, February 17, 1793: “You no doubt before this have heard of the arrival of the Bread-fruit ship (Captain Bligh), and a beautiful cargo he brought. He is a man of great ability, and certainly merits much. His arrival was some



"months sooner than I expected, and therefore you may conceive, I was, and still am, much hurried. Here are about 300 Bread-fruit plants thriving, with the other Otaheite fruits and useful plants, and several from Timor and other parts. I sent on board above 400 different species [from the St. Vincent Garden] for Kew, and had I expected the ship so soon, many more would have been ready. She remained here only seven days, and the confusion to me was so great in landing and shipping such a number of plants, that it was almost too much for me." Anderson, as indeed all others who knew him, appears to have entertained a warm regard for General Melville, who originated the St. Vincent Garden, and generously gave the land for it. He returns to the subject, July 23, 1794, "I send you specimens, one of which I think is a new genus. I wish to name it after my worthy friend, General Melville as some acknowledgment is certainly due to him from this garden. He first founded it, and its interests he has constantly had at heart. You will also find a drawing of it. Pray give me your opinion of it as soon as you can . . . I found it on an island in the River Essequibo [British Guiana]. If you find it new, please publish it in your Society's (Journal), as I wish to pay a compliment to the General before he dies."

The plant above mentioned was *Melvilla speciosa*, Anders., described in the *Journal of Arts and Sciences*. It was afterwards figured and described in the *Botanical Register*, pl. 852, as *Cuphea Melvilla*, Ldl. It is now known under the latter name.

During the disturbed period of the war with the French and the Caribs, St. Vincent was often in a very precarious condition. Anderson (May 13, 1795), after describing his garden:—"this spot is very beautiful and would be much admired in England," writes, "the garden is yet safe and flourishing; during the day I remain in it at the risk of my life, but I am obliged to fly to the fort during the night. I am determined to preserve it to the last extremity." Anderson's correspondence with Forsyth appears to have ceased about this time (1795). He survived, however, the troubles of the war, and in 1802, seven years later, wrote several very interesting letters descriptive of the work carried on in the garden, two of which, quoted from the *Transactions of the Society of Arts*, are given in full in Guilding's book. These were practically his last official communications.

Mr. Guilding's account continues:—

"Mr. Lohead did not long remain in the enjoyment of his situation; on the 22nd of March 1815 he joined his much lamented predecessor. His remains were deposited under one of the trees of the garden, a little above his dwelling-house, and covered by a neat and simple tablet. His widow, assisted by Mr. Billingham, was allowed to remain with the usual salary for nearly a year and a half, and the duties were performed by Mr. Herbert, an ingenious man, well qualified for the task.

"It now became necessary that a successor should be appointed. Through the interest of Sir Joseph Banks, Mr. George Caley and his assistant, Mr. McCray, were sent to take charge of the establishment, and arrived on the 1st of August 1816. The former gentleman had spent many years of his life in the forests of Australasia, and had brought home an abundant harvest from a field in which Brown and other celebrated travellers had already gleaned. His animals were purchased by the Linnæan Society, and are placed in the museum of that learned body. It is to be regretted that his services in the West Indies

have not been equally valuable. His residence at the garden had been made distressing from beginning to end, by continued and malicious trespasses, the violent assaults of strangers, and the encroachments of the neighbouring planters. Though much credit is due to him for the stern and inflexible honesty with which he defended the rights of the garden, it is yet much to be wished that a more liberal indulgence had been given to those who wished to visit this enchanting spot.

"In 1821 the Government, wearied probably by the constant complaints that had been made, determined on giving up the garden, which for so many years had been maintained at a great expense to the mother country, exceeding even of late the yearly sum of 700*l.* sterling. This step did not fail to cause great surprise. The nutmeg and other valuable spices had arrived at maturity; the cloves were producing annually a million of seed; and the garden, which had hitherto been comparatively of little use, was about to realise the hopes that had been entertained by its royal patron. Had a small guard from the neighbouring garrison done duty near the house, which might have been ordered without difficulty, the Superintendent might have been protected in the discharge of his duties, and the grounds have flourished as in the days of Anderson.

"The custody of the garden was resigned by Mr. Caley, December 24th, 1822, who returned to England in the month of May. The great seal was attached to the grant on the day the garden was given up by the Superintendent, and Mr. Herbert, with a small party of labourers, was appointed by the Governor to cultivate the land. The disappointment felt at its abandonment by the Crown has been fortunately dispelled by the choice of the Colonial Superintendent, under whose eye the establishment is in a very prosperous condition. Every facility is afforded by this obliging man for satisfying the curiosity of visitors, and seeds and plants are distributed on a proper application to the Governor.

"The extent of the garden, which is of irregular figure, does not exceed 39½ acres.

"The higher and hilly parts are a dense forest of useful woods, fruits, and palms, the bottom is the only part which has the least resemblance to the formal arrangement of an European garden. Here nature is unconfined, and this beautiful wilderness is without doubt the most charming residence of Flora in all her domains. A noble avenue, interrupted only by a single towering palm (*Areca Catechu*) runs from the house to the bottom, giving a view of the bay, the town, and a group of smaller islands within the government. A narrow walk leads the stranger round the bounds of this tropical nursery, and at the bottom affords a sight of the bold blue outline of the noble mountain which terminates the landscape.

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"The higher division, crowded with trees of larger growth, is perhaps most calculated to interest the European visitor. If he derives any pleasure from the beauties of picturesque scenery, on entering the silence of this solitude, he will be scarcely able to define what most excites his admiration, the individual beauty and contrast of forms, or that eternal spring and luxuriance of vegetable life which reigns around. Nature here appears prodigal of organic matter. The ground seems overloaded with plants, which have barely room enough for their development. The trunks of the older trees are everywhere covered with a thick drapery of ferns, mosses, and orchideous plants, which diffuse into the air the richest odours, and almost conceal from sight the noble plant



that upholds them. . . . Several rivulets of the purest water urge their meandering course through the brushwood; various plants of humbler growth, which love humidity, display their beautiful verdure on their edges, and are sheltered by the wide spreading arms of the Mango (*Mangifera indica*), Mahogany (*Sweitenia Mahagoni*), Teak (*Tectona grandis*), *Mimosa* (*M. Lebbek, nilotica, Catechu, &c.*), and other woods remarkable for their stateliness, and clothed in wild and magnificent pomp. The vegetation everywhere displays that vigorous aspect and brightness of colour so characteristic of the tropics. . . .

In crevices of rocks the succulent species are [almost] daily renewed, and prepare a soil for larger tenants; from their summits the old man's beard, the *Rhipsalis* (*R. Cassytha*, Hook.)\* and similar weeds, which seem to draw their nourishment from the air, hang pendant, floating like tattered drapery at the pleasure of the winds. . . . Above the rocky summit of the hill the arborescent ferns (*Cyathea aspera*?, *arborea, &c.*), the principal ornaments of our scenery, appear at intervals. Convolvuli and other creepers have climbed their high stems and suspended their painted garlands. The fruits of our country are scattered around within our reach, and the wide green leaves of the *Musa* (*M. paradisiaca* and *sapientum*) and *Heliconia* (*H. caribaea, Bihai*) planted beneath, serve to contain them for our refreshment, and to convey water from the neighbouring spring. On every side innumerable palms of various genera, whose leaves curl like plumes, shoot up majestically their bare and even columns above the wood. The portion below the house of the Superintendent has been devoted to the reception of the spices, the medicinal, and other more useful plants, which are placed in situations most favourable to their growth, rather than with a view to scientific order. In the same group are seen the precious nutmeg (*Myristica fragrans*), exposing in the centre of its bursting drupe the seed surrounded by the crimson mace; the *Cassia* (*C. fistula*) with its pendant pods of curious length; the magnificent *Lagerstræmia* (*L. reginae*) displaying one extended sheet of lovely blossoms; the cannon-ball tree, with its sweet and painted blossoms, scattering its fetid fruit, so much resembling the fatal shell, that one might suppose a company of artillery had bivouacked in its shade. The Calabash (*Crescentia Cujete*), with its large green pericarp, so useful in the poor man's hut, and the screw pine (*Pandanus odoratissimus*), with its fruit carved in rude and curious workmanship, and its ribbed stem supported on a bundle of faggots. Assembled together are the various fruits transplanted from the islands of Asia and other distant lands, or the woods of the Antilles, attracting, by their nectared flowers, the gaudy humming-birds. You behold the bread fruit (*Artocarpus incisa*) of the Friendly Islands, the most precious gift of Pomona, and the Jack of India (*A. integrifolia*), bearing its ponderous fruit of the weight of 60 or 70 lbs. on the trunk and arms. Here, too, a stunted Cork tree (*Quercus Suber*), and a small European oak (*Q. Robur*), sadly contrast their sickly forms with the proud offspring of the tropics. The Vanilla, with its long suckers, the Black pepper (*Piper nigrum*) of Asia, hang suspended on the boughs; the gaudy blossoms of the *Passiflora* and the long tubes of the *Solandra* (*S. grandiflora*) appear amidst the wood, mingling their blossoms with those of the neighbouring trees in wild confusion; while, at intervals, the *Agave* (*A. vivipara*) throws up its princely column of inflorescence from a

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[\* The plant generally known as the Old Man's Beard of the West Indies is *Tillandsia usneoides*, L.]

host of spears. Innumerable Cacti and Euphorbiæ covered with fruits or flowers, differing in the articulations of their stems, the number of their ribs, and the disposition of their spiculæ, give variety to the scene. At every step plants remarkable for their beauty or fragrance ornament your path. But I should tire the reader by continuing to enumerate the vegetable wonders of this paradise. In proper beds prepared for them we meet with the useful herbaceous species or the vegetables with which our tables are supplied. By the side of every rivulet rise large clusters of the Bamboo (*Bambusa arundinacea*), without a doubt the most generally useful of our plants. Nothing can exceed the beauty of this arborescent grass, which rises to the height of 60 or 80 feet, waving its light and graceful foliage at every breath of the winds. The *Cycas* (*C. revoluta*), and several kindred plants, so valuable for its nutritious fecula, are scattered about, attaining their greatest height in spots where nothing is allowed to impede their free development.\*

"St. Vincent's, December 14, 1824."

The botanic garden establishment at St. Vincent was removed to Trinidad in May 1823.†

After this time the fortunes of the garden steadily declined. It was found, however, that "no neglect could prevent from flourishing the few beautiful trees which still ornamented the ground. One of these, and one which especially struck a stranger, was the Cannon Ball tree. It attained a height of nearly 100 feet, and the fruits which clustered on the trunk resembled thirty-six pound shot. The flowers borne by this noble tree were red and white, assuming a shell-like form."

A local handbook published in 1884, from which the above is taken, states that "the disappearance of some of the rarest trees known to have been left in this garden must be attributed to the fact that no public servant was left in charge of the grounds. Each Lieutenant-Governor or Administrator appointed and paid his own gardener, who was usually only a labouring man. Thus knowledge of the value and rarity of the trees was lost and intervals of neglect were frequent. In 1828, after the discontinuance of the vote for the upkeep of the garden, a sum of about 2,000*l.* was voted to build a residence for the Governor, by adding to the cottage formerly occupied by the Superintendent. This residence was completed, and is still [after being rebuilt in 1886] occupied by the chief executive officer of the island."

The establishment of the botanical station was begun, as already mentioned, in May 1890. The progress made up to December of that year when the station was visited, in the course of his mission in the West Indies, by the Assistant Director of Kew, is given in the *Kew Bulletin*, May and June 1891, pp. 140-145. Since that time the suggestions offered to the Government for laying out the garden and for devoting it "to the discharge of the special functions assigned to it in developing the resources of the island" have been steadily and intelligently carried out.

The botanical station is under the personal direction of the Administrator, Captain Maling, C.M.G., who takes the deepest interest in its welfare. Much of the success which has hitherto characterised the

\* Attached to this account is an appendix with a "Catalogue of plants in His Majesty's garden in the island of St. Vincent, September 24, 1806." This list includes about 1,380 plants, many of them indigenous to the island. Of the introduced plants most of them still exist either at St. Vincent or in the botanical gardens at Jamaica and Trinidad.

† Shephard's St. Vincent (1831), Appendix, lxxvi.



work of this station is due to the sympathy and encouragement which the Administrator has shown during the course of its development. It is felt that the island is indebted to him for the active part he has taken in guiding and directing the efforts of the Curator in the channels best calculated to meet local requirements.

The services of the Superintendent of the botanical gardens at Trinidad, Mr. J. H. Hart, F.L.S., have been utilised from time to time, with the consent of the Government of that island, to supervise the station, and numerous plants have been received through the active co-operation of this officer.

In December 1890 the Curator reports:—

“During the latter part of November and the beginning of December a considerable portion of my time was taken up in collecting and preparing the principal fibres of the colony for the Jamaica Exhibition, also in assisting in the preparation of botanical specimens of nearly the whole of the plants possessing economic and commercial properties in the colony.”

These specimens proved of great interest and value, and they are mentioned in the official correspondence reproduced in the *Kew Bulletin*, May and June 1891, p. 166. Amongst the local plants yielding fibre is an Aroid plant little used elsewhere. This is *Xanthosoma sagittifolium*, Schtt., known locally as “China.” The petioles of the leaves are macerated in water, and a somewhat coarse fibre extracted from them. A form of *Agave rigida*, with short leaves, was found in St. Vincent by Mr. Hart, and latterly there has been received from that island for identification a specimen of *Furcræa gigantea* var. *villemetiana*. This is similar to the Mauritius hemp plant, but with some teeth.

In laying out the garden the original avenue leading from the Superintendent's house (now Government House) has been maintained. Numerous trees have been planted to replace those lost, and advantage has been taken of the natural undulations of the land and of the presence of a running stream to make the institution as attractive as possible.

The old established trees in the garden will be carefully preserved. Many of them, such as the Cohune Palm of British Honduras and Tobago (*Attalea Cohune*), the Teak (*Tectona grandis*), the Betel Nut Palm (*Areca Catechu*), and the interesting *Catostemma fragrans*, Benth., are of majestic size. The soil in the garden has apparently lost little of its fertility, while the presence of water in the immediate neighbourhood keeps the air at all times cool and humid.

The interest taken in the botanical station by local residents is shown by the following extract from the Curator's report, dated March 31st, 1891:—

“It is pleasing to note that the number of visitors to the garden, more particularly on Sundays, continues to increase. For the convenience of visitors a number of garden seats have been requisitioned from England.”

Economic plants raised at the station are sold locally at a nominal rate. The sum received for the sale of plants in June last was 2*l.* 19*s.* 8*d.* The object is not to make a revenue by the sale of plants, but to endeavour to secure an appreciation of the value of the plants to the recipients, and to obtain for them careful and suitable treatment after they have left the garden. The general experience is that where plants are distributed free of cost they are often neglected, and large numbers are lost without any compensating advantages.

As showing the useful though unpretentious work performed by this station, the following report for the quarter ending June 1891 is reproduced in full :—

Botanical Station, St. Vincent,  
15th July 1891.

“I beg to submit my [seventh] report on the Botanical Station for the quarter ended 30th June.

“Since the 1st of June two additional gardeners have been employed, making a total of six.

“The number of prisoners available for work at the garden since the 1st April to the 28th April inclusive averaged six daily. Since the above date they have been employed assisting in the formation and completion of the walk leading from Government House to the botanic garden, under the direction of the clerk to the colonial engineer.

“The twelve garden seats which were ordered from England arrived by the SS. *New York City* on the 3rd June, and for the convenience of visitors have been placed in different parts of the garden.

“Notice boards to which the rules and regulations for the guidance of visitors are affixed have also been set up in conspicuous places in the garden.

“About 540 square yards of turf have been cut in the lower end of the garden, and laid principally on either side of the central walk, and about 103 cubic yards of soil and ‘terras’ have been removed and utilised in filling up an adjoining low place, to form a walk about 140 feet long, leading from the central walk to the new seed-raising house.

“A stone drain, about 16 feet long, over which the walk crosses, has been built.

“The lengths of open drains cut during the quarter are as follows:—160 feet long by 18 inches wide, 260 feet long by 1 foot wide.

“About 14 perches of ground have been deeply trenched and planted with about 480 plants, including cabbage, savoy, *Chou de Burghley*, and cauliflowers. Previous to planting, holes were cut, and about a quart of well decayed pen manure placed in the bottom of each; soil was then placed on this, and the plants carefully transplanted from the beds where the seedlings had previously been picked out. Turnips and spinach have also been sown on a portion of this ground.

“A border about 222 feet in length and 6 feet in width, running from the Tennis court in the direction of the entrance to the garden, has been made, and planted with a mixed collection of flowering and foliage plants propagated in the garden.

“During April about an acre and a half of bush was cut down and cleared.

“With the exception of about an acre in the north-west corner, the whole of the garden, including the Banana, Sisal hemp, Pine-apple, Sugar-cane ground and nursery beds, has been thoroughly cleaned.

“One hundred and seventy nutmeg plants have been transplanted from the nursery beds, and permanently planted on the site of the former groves of nutmegs which were blown down during the cyclone of 1886.

“Seventy plants of *Theobroma cacao* (cocoa) have also been permanently planted in the banana ground, where a few cocoa plants previously planted are making fair progress.

“During the period under review, the following have been planted, viz.:—17 plants of the Ceara rubber (*Manihot Glaziovii*), which is

exciting so much interest at the present time amongst planters in various parts of the tropics; 6 plants of *Hevea brasiliensis*, or Para rubber, another valuable rubber tree; 12 plants of *Agave rigida* (true variety); 2 plants of *Bauhinia acuminata*; 4 plants of *Cassia siamea*, an ornamental tree, the timber of which is hard and durable; 2 plants of *Cassia fistula* (purging cassia); 5 plants of *Ficus Carica* (the Fig); 4 plants of *Calliandra Saman* (Rain tree); 2 plants of *Pachira spruceana*; 22 suckers of the *Charlotte Rothschild* (Pine-apple); 13 suckers of *Ripley Queen* (Pine-apple); 6 plants of *Poinciana regia* (Flamboyant); 3 plants of *Sesbania grandiflora*; 12 plants of *Vitis vinifera* (Grape vine).

"Two parcels of botanical specimens of the undetermined trees in the old and new gardens have been forwarded to Kew to be determined. Mr. Morris writes me: '*Catostemma fragrans*, Benth.,\* is a very useful tree for distribution to other botanical stations; it is probably not met with in any other West Indian Island. The fruit was received at Kew for the first time.' The following extract is taken from the *Treasury of Botany*:—'*Catostemma* is a genus of the myrtle family (Myrtaceæ), and found in British Guiana. The only species known (*C. fragrans*) is a tree about 50 feet high, The fruit is not known.'

"The next most interesting plant in the collection according to Mr. Morris is *Pachira spruceana*, Dene., which has large tassel-like flowers from 12 to 15 inches in length.

"Dr. Nicholls, during his recent visit to this colony, informed me that one species of *Pachira* is a very useful shade and shelter tree for cocoa, being used in some places for that purpose.

"Mr. Morris further states that *Jacaranda obtusifolia* should prove interesting, and that the Pepper vine, which is growing in great profusion above Government House, is identical with the *Piper Bette* of Ceylon and India, and deserves to be protected.

"In his lecture delivered at the Court House, on the 27th December last, Mr. Morris stated that the Sansevieria or Leopard Lily, a valuable fibre plant, could be readily propagated by cutting the leaves into lengths, and inserting the same in sandy soil. About 700 plants have been already obtained in this way.

"The original plants were received from Jamaica (12 plants) and Trinidad (6 plants) in July 1890.

"The collecting of bamboo stems for using as plant pots, and the placing of seedlings in same, is being proceeded with.

"I attach lists† showing the number of plants sold during May and June, the proceeds of which have been paid into the Treasury, the number of plants for sale at the garden, with the prices attached, and lists of the plants and seeds received from and forwarded to other botanical stations.

"(Signed) H. POWELL, Curator."

In October 1891 the Curator prepared information, afterwards published in the *Government Gazette*, on the cultivation of the Grape Vine at St. Vincent. A supply of cuttings of the best English cultivated grapes was sent out from Kew in November 1890, and from these 200 plants were raised. A further supply of vine cuttings, figs, and pine-apples was despatched in February 1891. A memorandum on the cultivation of the pine-apple was published by the Curator, with

\* *Icones Plantarum*, pl. 1986.

† Not reproduced.



his report for the month of December 1890. Plants of the sugar-cane known as the "Caledonian Queen" were introduced from Barbados, and grown in the garden to supply local demands. Plants of the *Gros Michel* banana, indetical with the well-known Jamaica banana, largely shipped to the United States, were also introduced to St. Vincent, and established at the botanical station. These have since been propagated and distributed to various estates in the island.

In a later report, dated 31st December 1891, Mr. Powell discusses the use of manure for the cultivation of tropical plants :

"During the period under review about 250 bushels of stable manure have been obtained from the manure heap at Government House, and utilized in the garden. On more than one occasion my attention has been drawn to the accumulation of manure at the back of Paul's Lot, where at the present time several hundred cart loads are lying. This manure is composed of the sweepings of the town, stables, &c., all of which in England would be turned to good account. To one who has been brought up in an English garden, and who has been accustomed to see every bushel of manure carefully husbanded, the waste of valuable manure which goes on in Kingstown is simply astounding. The soil which has come under my notice in this colony is, for the most part, of a light, sandy, non-retentive nature, and, if good crops are desired, renders the heavy application of manure a necessity. To expect impoverished land to produce good crops is like expecting a half famished horse to do the same amount of work as a well fed one."

A very suitable and attractive looking house has lately been built for the Curator, under the direction of Mr. David S. Osment, the colonial engineer. The total cost was estimated at about 350*l*. A plan has been prepared from Mr. Osment's drawings, and as this may very well be adopted as the type of a suitable house for curators in charge of botanical stations in the tropics, it is reproduced in the present number. Mr. Powell took up his residence in the house on the 3rd November last. He states that two rooms in it will be set apart for the use of the station, one as an office and library, the other for herbarium purposes. At present the library consists of a number of useful books, a list of which is given in the report of the station for the quarter ending 30th September 1891.

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## CCXLII.—MISCELLANEOUS NOTES.

The Botanical Department of Columbia College, New York, has sent a further parcel of Dr. Morong's *PILCOMAYO* plants.

From the TRANSVAAL, Mr. E. E. Galpin, F.L.S., has sent a small, but very interesting, collection of dried plants, in continuation of many previous consignments. A fine new species of *Anthocleista* is the most striking plant among them.

Dr. H. Baillon, Professeur d'Histoire Naturelle, Faculté de Médecine, Paris, has presented a collection of about 400 species of *MADAGASCAR* PLANTS, about half of them from the western side of the island, whence we had almost nothing, as no English travellers have collected on that side, except John Forbes, who seems to have landed and picked up a

few things. A considerable number of the specimens are types of novelties published by Dr. Baillon, and therefore possess a special value. Among these novelties are *Aprevalia* and *Boudouinia*, two very remarkable new genera of *Leguminosæ*.

The Rev. R. B. Comins has sent a second small collection of dried plants from the SOLOMON ISLANDS, including several highly interesting things. Specially interesting among these are flowering specimens, though not perfect, of the tree that bears the so-called turtle-seeds of the islanders. This tree belongs to the *Sapotaceæ*, and will shortly be published as a new genus of that order by Mr. W. B. Hemsley. The seeds are one of the most singular productions in the vegetable kingdom, and the name given to them by the natives of the Solomon Islands is quite appropriate, as the resemblance is most striking. Mr. Comins collected seeds of what appears to be a second species of the genus, and Kew previously possessed a seed and foliage of a third species, collected in the Fiji Islands in 1878 by Mr. Horne, the Director of the Botanic Garden of Mauritius. There are also seeds of one or two other species in the Museum, where they have been for some years, but their origin is unknown.

Another very curious plant collected by Mr. Comins is *Lasianthera papuana*, in which the originally three-celled ovary develops into a fruit with one fertile, dry, woody cell, the two empty cells forming a fleshy body on one side of it.

The Palms and Pandanads, which, with the Cycads, now form the most striking feature of the large PALM HOUSE at Kew, have increased so much in size as well as in number, as to necessitate a re-arrangement of the whole of the plants to provide more ample accommodation for the specimen Palms. These now occupy, with other large monocotyledonous plants, the whole of the central part of the house and the north wing, excluding the side shelves. The large Cycads, with the large dicotyledonous plants are arranged chiefly in the south wing of the house. The small Cycads are on one of the side shelves.

Plants of the interesting DOUBLE COCOA-NUT or *Coco de mër* (*Lodoicea seychellarum*) have been raised at Kew from nuts and a germinating plant forwarded to this establishment by the Honourable T. Risely Griffith, Administrator of the Seychelles. The largest plant is now developing its third leaf; the dimensions of the second leaf, developed last year, are as follows:—Length of petiole 30 inches, length of blade 4 feet, width of blade 4 feet, number of folds in blade 56. The midrib of the leaf describes a semicircle, and the whole of the divisions, which are a foot long, are recurved. This plant will shortly be placed in the Victoria House, where there are now young healthy examples of the following somewhat rare PALMS in cultivation:—*Mauritia flexuosa*, *Manicaria saccifera*, *Hyphæne thebaica*, *Borassus flabelliformis*, *Bismarckia nobilis*, *Pholidocarpus Ihur*, *Licuala grandis*, and *Socratea exorrhiza*.

PODOCARPUS PECTINATA.—At Kew there is a species of *Podocarpus* in cultivation, lately received from Mr. Moore, of the Sydney Botanic Garden, with the information that it was a native of New Caledonia.

The same species apparently is in cultivation elsewhere in this country, and it is suggested in the "Gardeners' Chronicle" (3rd series, xi. p. 113), that it might be the "*P. pectinata* of Brongniart and Gris, a specimen of which is in the Kew Herbarium, authenticated by one of the authors; but we have not succeeded in discovering whether or no the species has been published."

The suggestion is a good one, and we have no hesitation in referring the plant to the species in question; but Brongniart and Gris did not publish it under *Podocarpus*. They described it (*Bulletin de la Société Botanique de France*, xvi. p. 330) as *Dacrydium Pancheri*, with a note to the effect that Pancher, who collected it in New Caledonia, had attached the name *Podocarpus pectinata* to the specimens. Bentham and Hooker (*Genera Plantarum*, iii. p. 435) refer this and some allied species to their section *Dacrycarpus* of *Podocarpus*, and following this we must write *Podocarpus pectinata*, Pancher.

There are about 50 known species of *PODOCARPUS*, and they are distributed over the sub-tropical and sub-alpine regions of both hemispheres. The following are represented by living examples in the Kew collections:—

Cultivated in the open air: *P. alpina*, R. Br., Tasmania; and *P. chilina*, Rich. ("Maniu," "Pino"), Chili.

Cultivated in the Temperate House (Winter Garden): *P. bracteata*, Bl., Java; *P. cupressina*, R. Br. ("Kimerak," "Ki-poetri"), Java; *P. dacrydioides*, A. Rich., New Zealand; *P. elongata*, L'Herit. ("Outeniqua," "Geelhout," "Yellow wood"), S. Africa; *P. elata*, R. Br., Australia; *P. japonica*, Sieb., Japan, and *P. japonica* var. *variegata*; *P. macrophylla*, Don ("Maki"), Japan; *P. Nageia*, R. Br. ("Nagi," "Tsikkura-Siba") Japan, and *P. Nageia* var. *rotundifolia*; *P. neriifolia*, Don, Nepal; *P. nubigena*, Lindl., Island of Chiloe; *P. spicata*, R. Br. ("Mai," "Matai"), New Zealand; *P. taxifolia*, H. Bk., New Granada; *P. Totara*, Don ("Totara"), New Zealand.

Cultivated in the stove: *P. coriacea*, Rich. ("Yacca"), Jamaica; *P. purpessina*, R. Br., Java; *P. pectinata*, Panch., New Caledonia; *P. puidiceana*, Hk., Jamaica, Cuba; *P. salicifolia*, Kl. Karst, West Indies.

Strawberries are often tried in the tropics, but with varyin success. In the cool climate of the hills they do very well for a time, but even there the choice sorts appear to deteriorate, and to require to be renewed at frequent intervals. Plants packed in Wardian or dry cases travel rather badly, sometimes as many as one-third to one-half being lost in one sending. To obviate this efforts have occasionally been made to send out seed selected from good sorts. In acknowledging the receipt of some seed forwarded from Kew, Mr. M. A. Lawson, F.L.S., Director of the Botanical Department, Madras, writes from Ootacamund, 15 February 1892:

"I shall be very glad to try the strawberry seeds, but my attempts in that line have not been a success hitherto; as the plants raised from seed have always harked back to the old Alpine variety.

"We have, nevertheless, very good strawberries both in Ootacamund and Bangalore, but they are grown only on a small scale.

"I am trying to domesticate our wild strawberry of these hills, but as yet I have done no wonders with it."

Mr. A. Henderson, Runnymede, Florida, under date of February 12,



1892, writes: Strawberries have just commenced, and they will keep "on until May. We have here a particular kind, consisting of three "varieties, that does exceedingly well in warm countries. The "runners are cut off until May (when the crop ends). This is a "perpetual fruiting kind. The northern and English varieties will not "thrive here."

In the Blue Mountains, Jamaica, a wild strawberry, supposed to be an escape from gardens, is found very abundantly at elevations of 4,000 to 5,000 feet. The fruit is regularly gathered and sold in the Kingston market.

The following note on GINSENG is given in the *Official Guide* to the Museums of Economic Botany at Kew (Dicotyledons and Gymnosperms), p. 87:—

"Ginseng, the root of *Aralia quinquefolia*, A. Gray, var. *ginseng*, Reg. et Maack, is native of North China. It is so highly valued as a tonic and stimulant medicine in China that it is sold at from 20 to 250 times its weight in silver, sometimes for 500 times this amount. It possesses no important medicinal properties. Corean ginseng is the principal article of export from Corea into China. It ranks in quality next to the Manchurian or Imperial. The red, or clarified Corean ginseng is made by steaming the roots for about four hours in wicker baskets enclosed in a closely fitting earthenware vessel pierced at the bottom with holes, and placed over boiling water. Note also roots of *A. quinquefolia*, A. Gray, from North America, having slight demulcent properties, collected in the Alleghany highlands from Pennsylvania to Tennessee, and sold at a dollar a pound for exportation to China as a substitute for the Chinese product. The average importation (of 20 years) mainly through Hong Kong is about 400,000 lbs. It is ranked by the Chinese as about fourth in quality, Japanese being the least esteemed."

Efforts have been made from time to time to establish the COREAN GINSENG plant at Kew. Recently a small packet of seed was received at this establishment from Mr. Walter C. Hillier, Her Majesty's Consul-General in Corea, with the following interesting note, dated Scül, January 6th, 1892:

"I have taken some time to reply to your letter of last May with regard to Ginseng seeds, owing to the great difficulty I have experienced in procuring any. The Coreans are very loth to part with seeds for fear that their practical monopoly in this root should be invaded, and I had almost despaired of success. I am happy to say, however, that I have at last managed to get a small quantity of seed from the large Government Gardens at Songdo, the ancient capital of this province, some 60 miles from this city. I am sending you these seeds under separate cover, and I shall be interested to hear what success you have met with in the attempt to make them grow. You will probably not require any hints as to cultivation, but it might be useful to you to know the system adopted by the Coreans. The seeds are sown in the spring in beds of fine leaf mould, no manure being used. The beds are raised about a foot and a half, are protected from the north winds, and screened at night with mats, an awning of mats being placed over the beds during the fierce heat of summer. At the end of the first year the plants are set out, and it takes five or six years for them to reach maturity. The yearly range of temperature at Songdo is wide, say from zero to 90° Fahrenheit."

There has lately been presented to the Museums of Economic Botany at Kew, by Mr. Joseph Sturge, Managing Director of the Montserrat

Company, Limited, a specimen of L'ECUELLE (porringer), an interesting instrument used for extracting the odorous principle from the rind of the fruits of the orange, lemon, and lime. This consists of a copper basin about nine inches in diameter. The concave inner surface is furnished with studs about half an inch long, with rounded points, rivetted in closely packed rows in the lower portion of it. There is a hole at the bottom leading into a long narrow funnel about six inches long, which also serves as a handle. A figure of this instrument is given in Piesse's *Art of Perfumery*, 1879, p. 150. The specimen presented by Mr. Sturge is one that has been in use for many years for extracting "essence of limes" on the Montserrat Company's estates in the West Indies. The instrument is held in the left hand, the fruit is taken with the right and gently rubbed with a circular motion on the projections inside the basin. This action bruises the oil glands in the rind, and the oil flows in small quantities on to the surface of the studs. Thence it trickles down to the bottom of the basin and the funnel below. The process is obviously a slow one, and it is necessary to have at least two or three dozen operators, and plenty of limes for them to work upon. In the West Indies negro women and girls are usually employed. These sit down close to a large heap of limes and roll the fruits quickly one after the other on the projections inside the basin. It generally takes some hours to extract a sufficient quantity of essence to fill the funnel, holding about a fluid ounce. When this is done, the essence is taken to the storeroom, and placed in a large glass jar to clarify ready for shipment. Piesse states that the essence prepared in this manner at Montserrat is so pure "that it is worth twice its present price in the market."

A minute BORING BEETLE, about one-twelfth of an inch long, identified by Mr. W. H. F. Blandford, F.Z.S., as *Xyleborus perforans*, Wollaston, appears to have become injurious to sugar canes in the West Indies. This beetle was described by Wollaston from specimens perforating the bungs of wine casks at Madeira. Mr. Herbert H. Smith lately engaged in exploring the Fauna of St. Vincent, found the beetle in sugar canes in that island, but he was of opinion that it only attacked canes already injured by the well-known moth-borer (*Chilo saccharalis*). He adds that "it is common in all parts of tropical America, frequenting "rotten vegetation, and especially cane refuse. On the Amazons it bores "into rum barrels. It is one of the insects that is most frequently "attracted by lights at night." Mr. Blandford states that this insect has been known for thirty years as destructive to beer casks in India and it also occurs through the Bornean archipelago. It is, however, distinct from the species described as injuring barrels in *Kew Bulletin*, 1890, p. 181. Specimens of this same beetle have been received from Barbados and Trinidad. In both places it is said to attack growing canes and to prove destructive. If this view be confirmed, it would appear that a beetle hitherto confined to dry and rotten wood and vegetable *débris* has now become injurious to living plants. There should, however, be no difficulty experienced by intelligent planters in the West Indies in dealing with this new cane borer. The infested canes should be destroyed, either by burning or passing through the rollers of the cane mills. Care should be devoted to the selection of "plant" canes, to ensure that they are free from the grubs and eggs of the beetle, and precautions be taken to get rid of all cane refuse in a decayed state in the neighbourhood of the cultivated fields. In other respects the same steps are necessary with this borer as have been found effective in the case of the moth-borer. This latter has been known to attack sugar canes at intervals for nearly 60 years, but its influence has

been rendered comparatively harmless by the systematic destruction of infested canes, and by examining and dressing the "plant" canes before they are put out in the fields. These simple and effective methods are fortunately within the reach of every one.

THE AKEE (*Blighia sapida*, Kg.) a well-known African tree belonging to the soap-berries (*Sapindaceæ*), is naturalised in the West Indies and other parts of tropical America. The creamy aril forming a succulent socket surrounding the base of the seeds affords, when cooked, a very palatable food. Occasionally, however, cases of poisoning by Akee have been recorded. In Jamaica recently a mother and children are believed to have died through eating Akee. Mr. J. J. Bowrey, F.C.S., F.I.C., Government analytical chemist, has communicated a report to the Government of Jamaica on the wholesomeness of the Akee as an article of food as follows:—

(1.) Unripe Akees if eaten freely bring on vomiting. (2.) Decaying Akees are decidedly unwholesome, and may be even very poisonous. This is true of many foods. (3.) Fresh ripe Akees are good and harmless food, rather rich it is true, but to most persons quite wholesome. There may be individual idiosyncrasies with regard to Akee, as there are to such usually harmless foods as mutton, duck, pork, mushrooms, &c. (4.) The red membrane of the Akee, so commonly believed to be poisonous, is perfectly harmless. (5.) If the fruit be ripe and fresh, which can be known by its being open, the edible portion firm, and the red part bright in colour, I consider it a good and safe food. But if the fruit be not ripe, or if there are any signs of decay, such as mouldiness or softening of the edible portion, or a dingy colour in the ordinarily red-coloured part, the fruit should not be eaten."

The cultural industries at the GAMBIA have been discussed in the *Kew Bulletin*, June 1889, p. 142, and December 1890, p. 261. The botany of the Gambia Delimitation Commission is given in the *Bulletin* for October and November 1891, p. 246, and February 1892, p. 45. In a letter, dated 24th February last, His Honour R. B. Llewelyn, C.M.G., Administrator of the Settlement, points out the almost insuperable difficulties experienced in endeavouring to establish cultural industries in this part of West Africa:—

"Since I came out here in April, between attacks of fever and expeditions against chiefs I have had very little time to look after agriculture. What can be done in a country when, practically speaking, there is not a single drop of rain for eight months in the year? The time to collect botanical specimens is during the rainy season, when everything is green, but then that is the time when Europeans cannot tramp about without great risks. The island of St. Mary, on which Bathurst stands, is merely a bank formed by *débris* from the river, and is barely above high-water mark. In the rainy season it is covered with water, as there are no means of draining it.

"During the dry season English vegetables, cabbages especially, grow well, but they have to be watered. I have prepared and published a comparative rainfall and a few meteorological statistics which I enclose. [Reproduced below.] With the natives, ground nuts are, as you know, the staple product. Oil mills in Marseilles receive nearly all that are grown. The difficulty here is getting fresh water to keep young plants alive during the eight months' drought. I hope to be in England in July, and before I return in November I must try to see you. At



present I cannot see any chance of doing much to improve the exports. Large bush fires, lighted indiscriminately, destroy young trees planted out. I have distributed rubber plants and cocoanuts; a few of the former are doing fairly well at Cape St. Mary."

### COMPARATIVE RAINFALL in the COLONY of the GAMBIA.

	1887.	1888.	1889.	1890.	1891.
January - -	—	·02	—	—	·01
February - -	—	—	—	—	·16
March - -	—	—	—	—	—
April - -	—	—	—	—	—
May - -	·23	—	—	·04	·53
June - -	1·67	·58	1·16	2·40	4·67
July - -	11·38	8·54	3·23	16·42	7·42
August - -	19·82	13·47	15·57	19·90	18·84
September - -	13·70	9·71	10·65	16·58	19·81
October - -	7·16	6·77	1·45	4·97	1·97
November - -	—	—	—	—	—
December - -	—	—	—	—	—
Total rainfall - -	53·96	39·09	32·06	60·31	53·41

Average 47·76 inches.

### METEOROLOGICAL STATISTICS, BATHURST, GAMBIA.

1891. Month.	Average for Month at 7 a.m.			Maximum in Shade at 3 p.m.			Maximum in Shade at 7 a.m.			Total Rainfall in Inches.
	Dry Bulb.	Wet Bulb.	Dew-point.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	
July - -	87·8	76·2	74·5	92	82	86·7	78	68	73·4	7·42
August - -	76·8	75·4	74·2	88	75	83·7	75	70	72·7	18·84
September - -	77·3	75·1	73·6	90	80	85·9	75	69	72·3	19·81
October - -	77·5	75·4	73·5	90	83	87·4	77	69	73·1	1·97
November - -	73·4	67·8	63·8	90	80	84·4	74	64	68·8	—
December - -	69·8	63·3	58·4	92	80	84·7	68	62	65·7	—

31st December 1891.



